

Twelve-Month Follow-up of Lumbar Spine Range of Motion Following Intervertebral Disc Replacement Using Radiostereometric Analysis

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ABSTRACT

BACKGROUND

Many clinical studies have focused on clinical pain scores and less on kinematics following intervertebral disc replacement. Although flexion and extension of the motion segment can be measured on lateral X-rays, measuring lateral bending and axial rotation of the device is extremely difficult on plain radiography. This study was designed to measure, using radiostereometric analysis (RSA), the postoperative range of motion of the spinal segment following placement of ProDisc-L interbody device (Synthes Spine, West Chester, Pennsylvania).

METHODS

Twelve patients (15 discs) with a ProDisc-L intervertebral disc replacement were followed postoperatively at 1.5, 3, 6, and 12 months with both clinical and RSA examinations. For follow-up RSA analysis, 4 to 5 tantalum beads were inserted into the vertebrae adjacent to the surgical level during surgery. Standing biplanar films were collected during follow-up, and the ranges of motion (ROM) (sagittal and coronal bending) of the adjacent vertebrae were determined by RSA.

RESULTS

Based on the clinical surveys, this group of patients had

similar outcomes compared to larger clinical populations. The flexion/extension ROM with the disc replacement averaged 2.5° at 6 weeks and increased over the follow-up period to 6.6° at 6 months. The lateral bending ROM with the disc replacement remained consistent over the 4 time points and averaged 3.0°. The motion at the level of the L4-5 vertebrae following disc replacement was greater across all time points than the motion at the L5-S1 level for both sagittal (5.9° versus 2.1°) and coronal (4.2° versus 0.6°) bending.

CONCLUSIONS

In this study, the amount of RSA-measured segmental flexion/extension ROM for those with disc replacement was similar to other studies using plain radiography. In lateral bending, the amount of motion with disc replacement was less than the typical 6°–16° reported for normal ROM.

Clinical Relevance

This is the first published study evaluating the in vivo kinematics of artificial disc replacement using RSA.

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